

The background of the slide is a photograph of a savanna landscape. In the foreground, there is a flat, golden-brown field. In the middle ground, several acacia trees with their characteristic flat-topped canopies are scattered across the horizon. The sky is a vibrant blue, filled with large, fluffy white cumulus clouds. The text is overlaid on the upper and middle portions of the image.

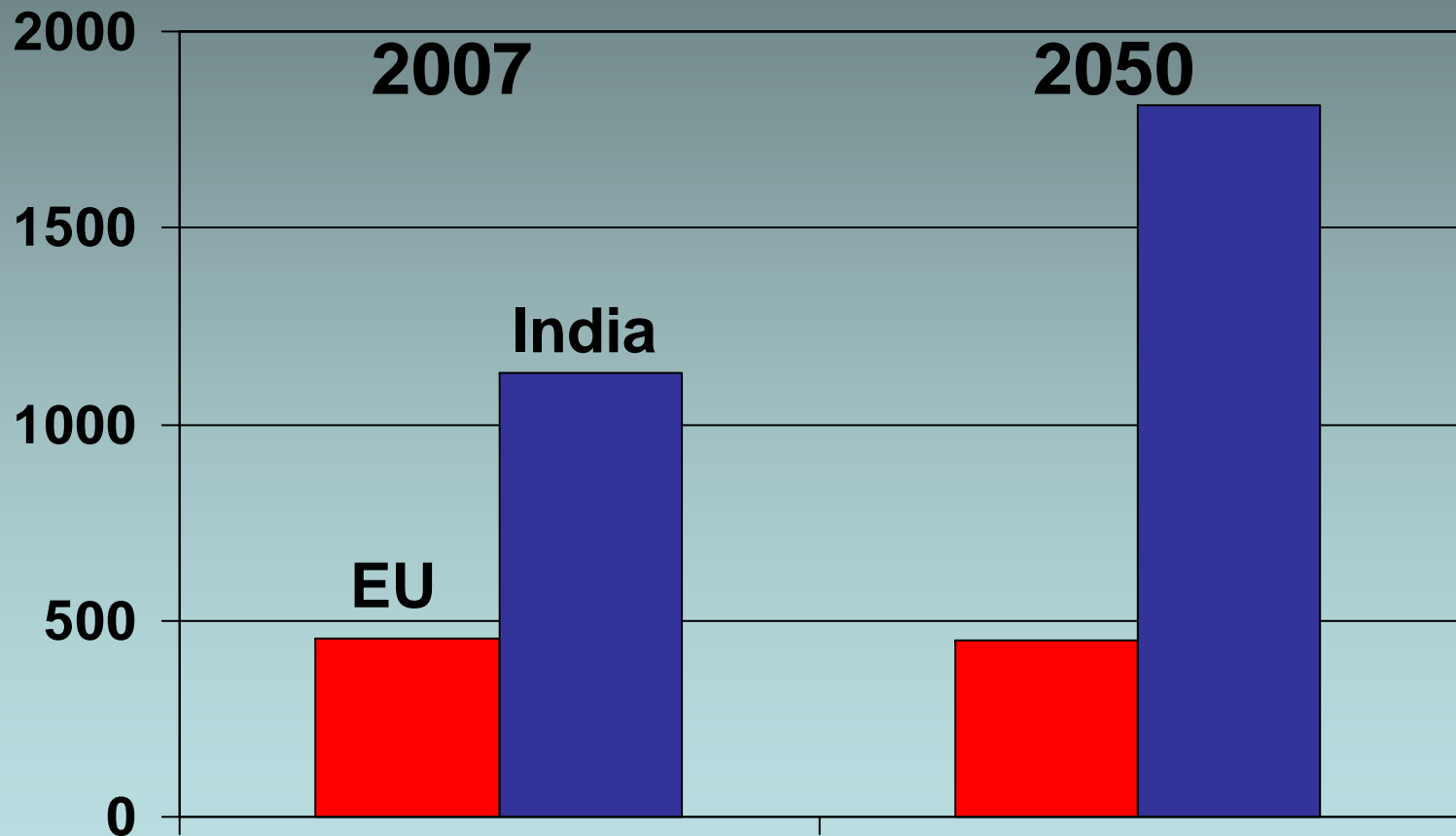
Food, Livestock, Health - some applications of biotechnology

**Patrick Cunningham
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**EU-India Workshop on Biotechnologies
New Delhi 23-24 April 2007**

Population

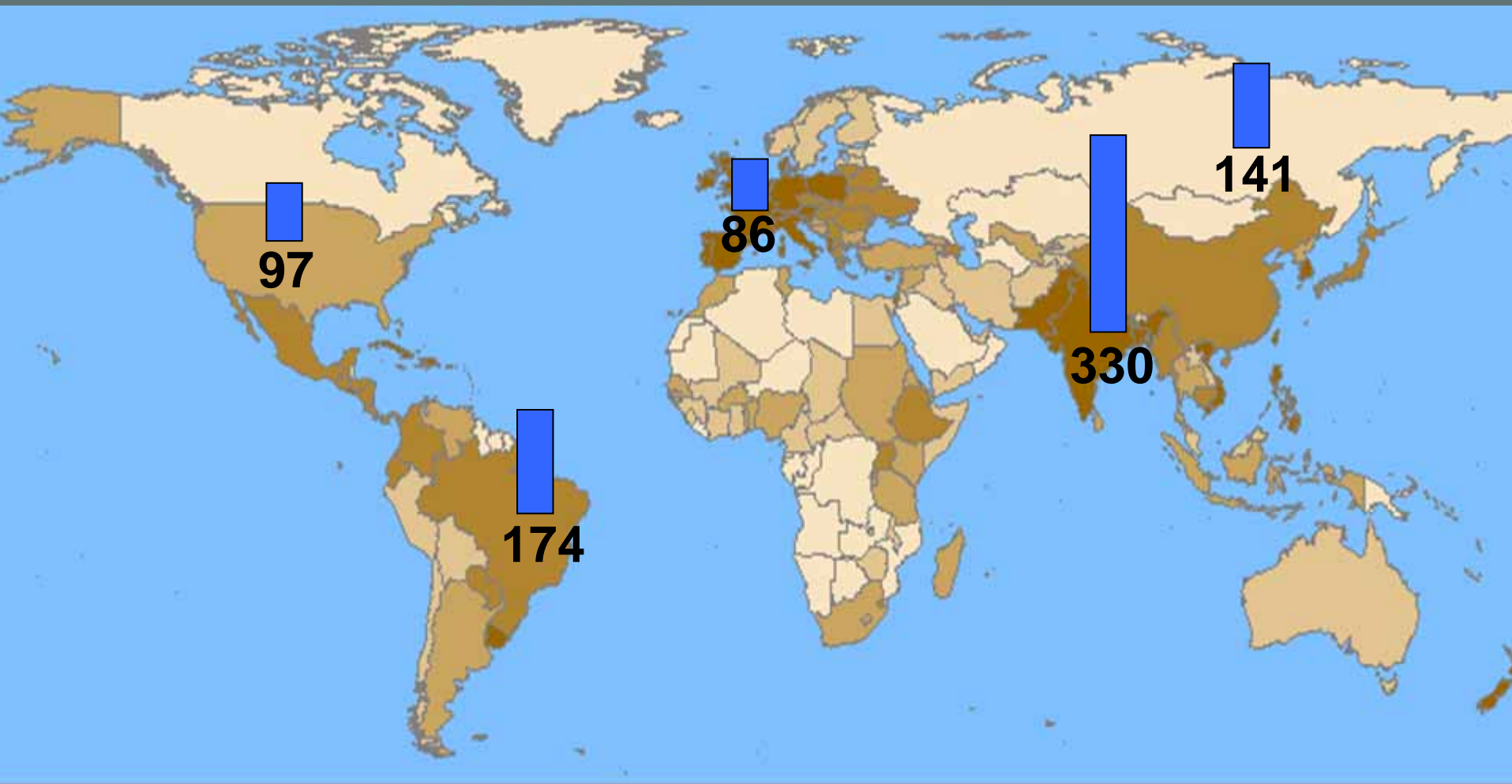
million

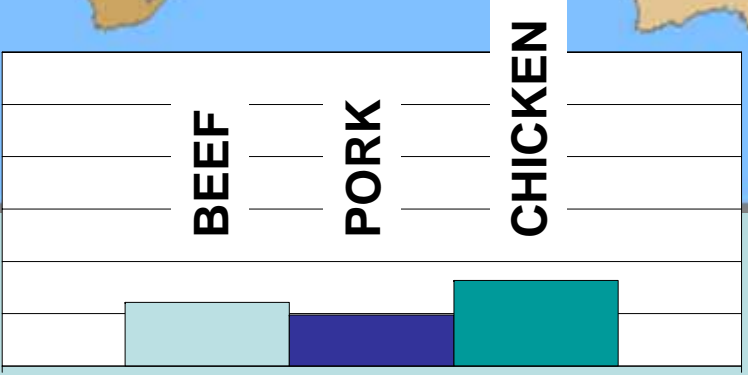
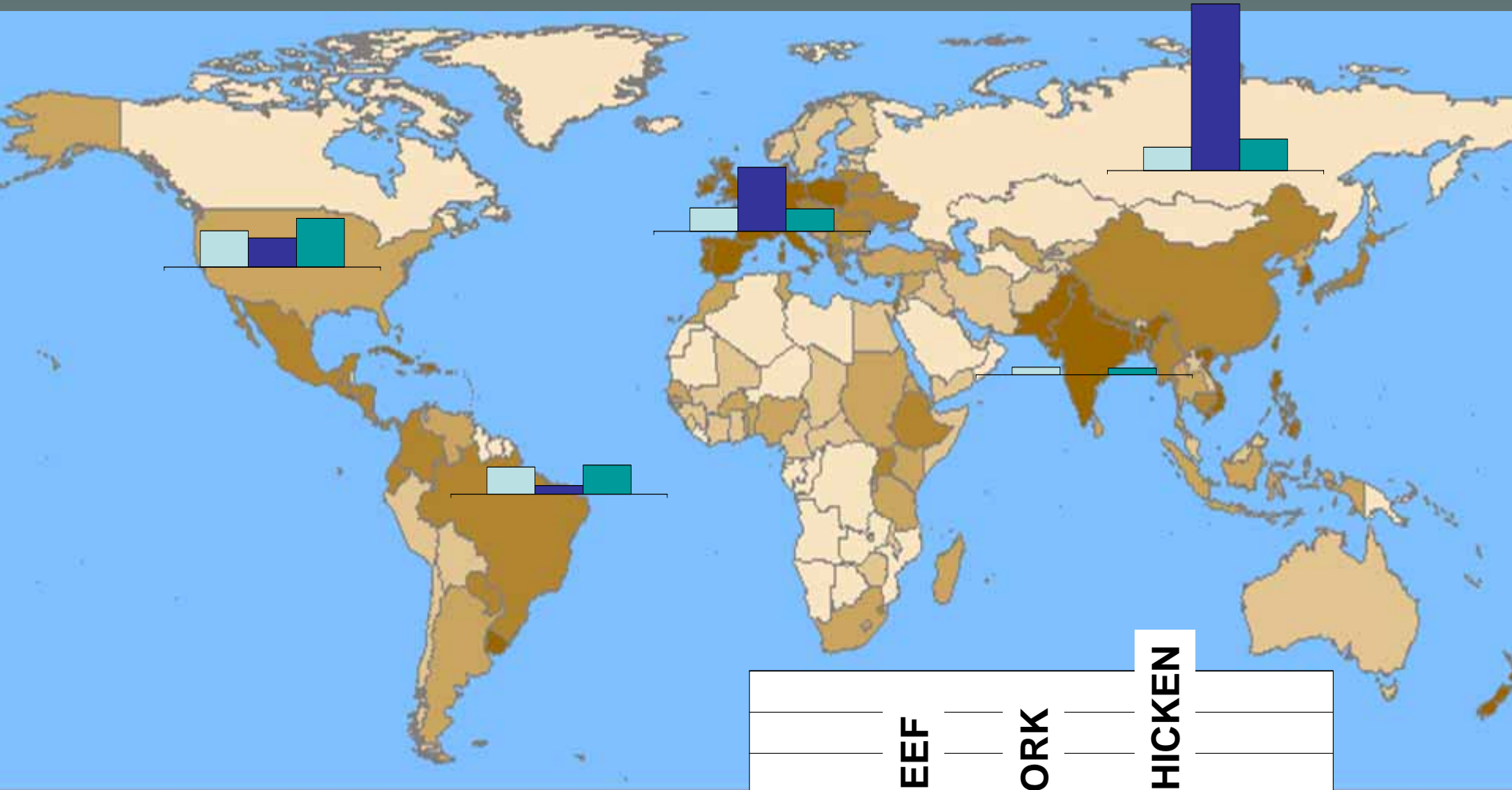


Consumption Kg/Head

| | Meat | Milk+ |
|---------------|-------------|--------------|
| India | 4 | 86 |
| China | 56 | 27 |
| US | 127 | 291 |
| EU | 82 | 291 |
| Brasil | 88 | 140 |

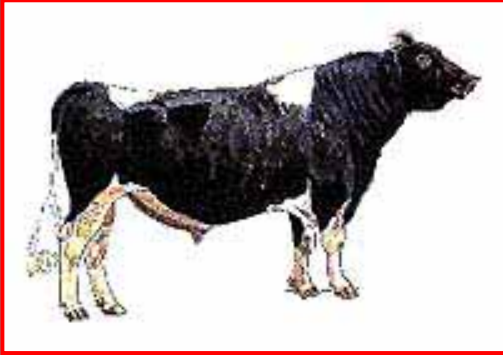
Cattle numbers (millions)





Two kinds of Cattle

Taurine (*Bos Taurus*)



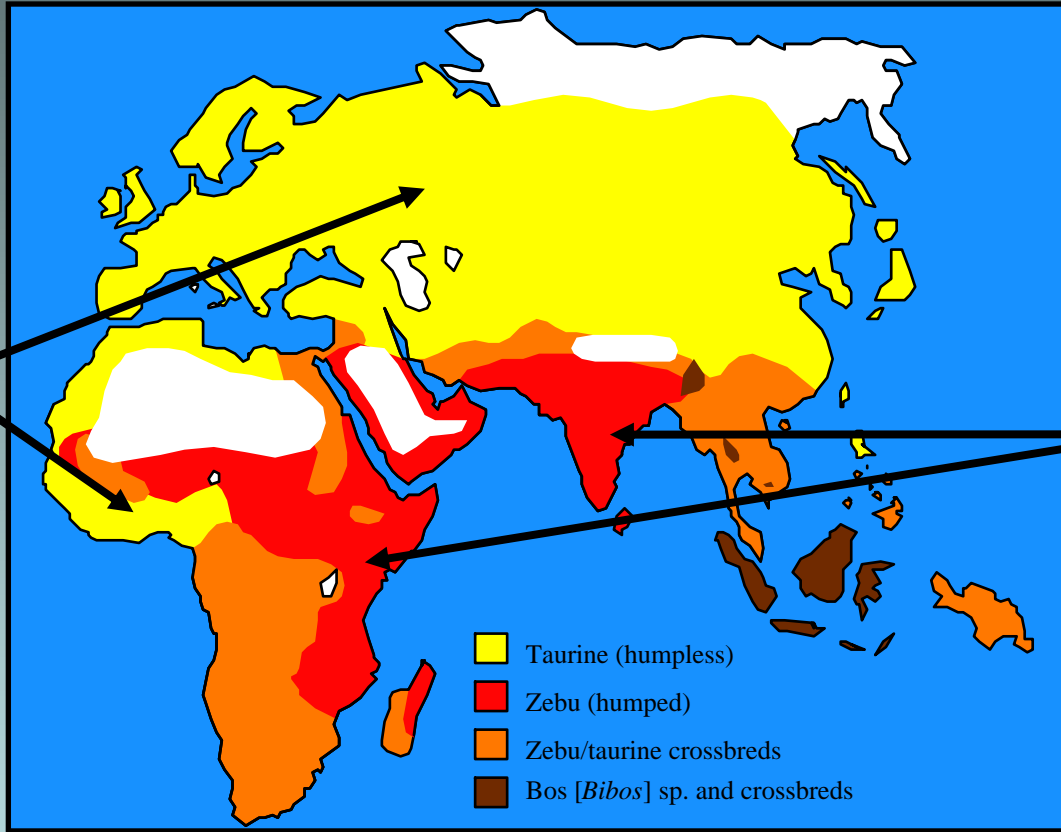
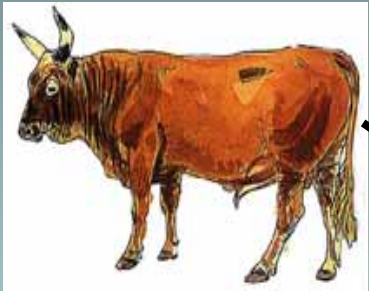
- Temperate climates - higher rainfall, dense vegetation. Europe, Northern Asia, West Africa.
- European taurine - high milk yields, meat quality etc.
- West African taurine - **trypanotolerant** - can resist effects of **trypanosomiasis** (spread by **tsetse fly**).

Zebu cattle (*Bos Indicus*)

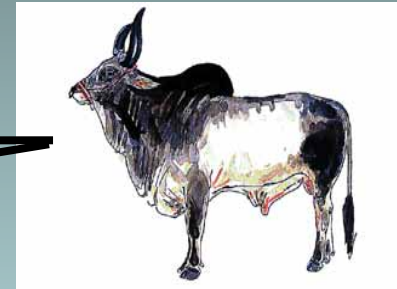


- Hot arid and semi-arid regions of Asia and Africa.
- Hump, dewlap, lower metabolic rate, larger sweat glands, resistance to ticks, intestinal parasites. Lower water and fodder requirements.
- Stronger herding instincts, different vocal sounds, meat is tougher.

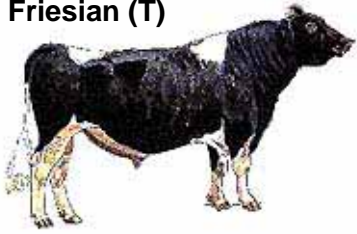
Bos taurus
(taurine)



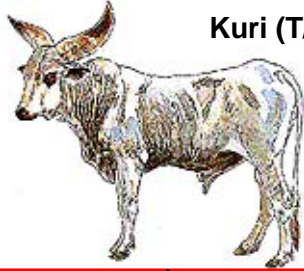
Bos Indicus
(zebu)



Friesian (T)



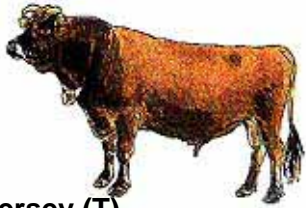
Kuri (T/H)



Sahiwal (Z)



Jersey (T)



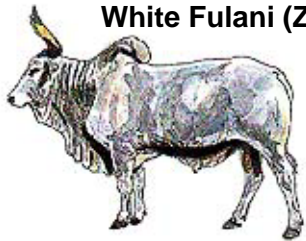
Kankrej (Z)



N'Dama (T)



White Fulani (Z)

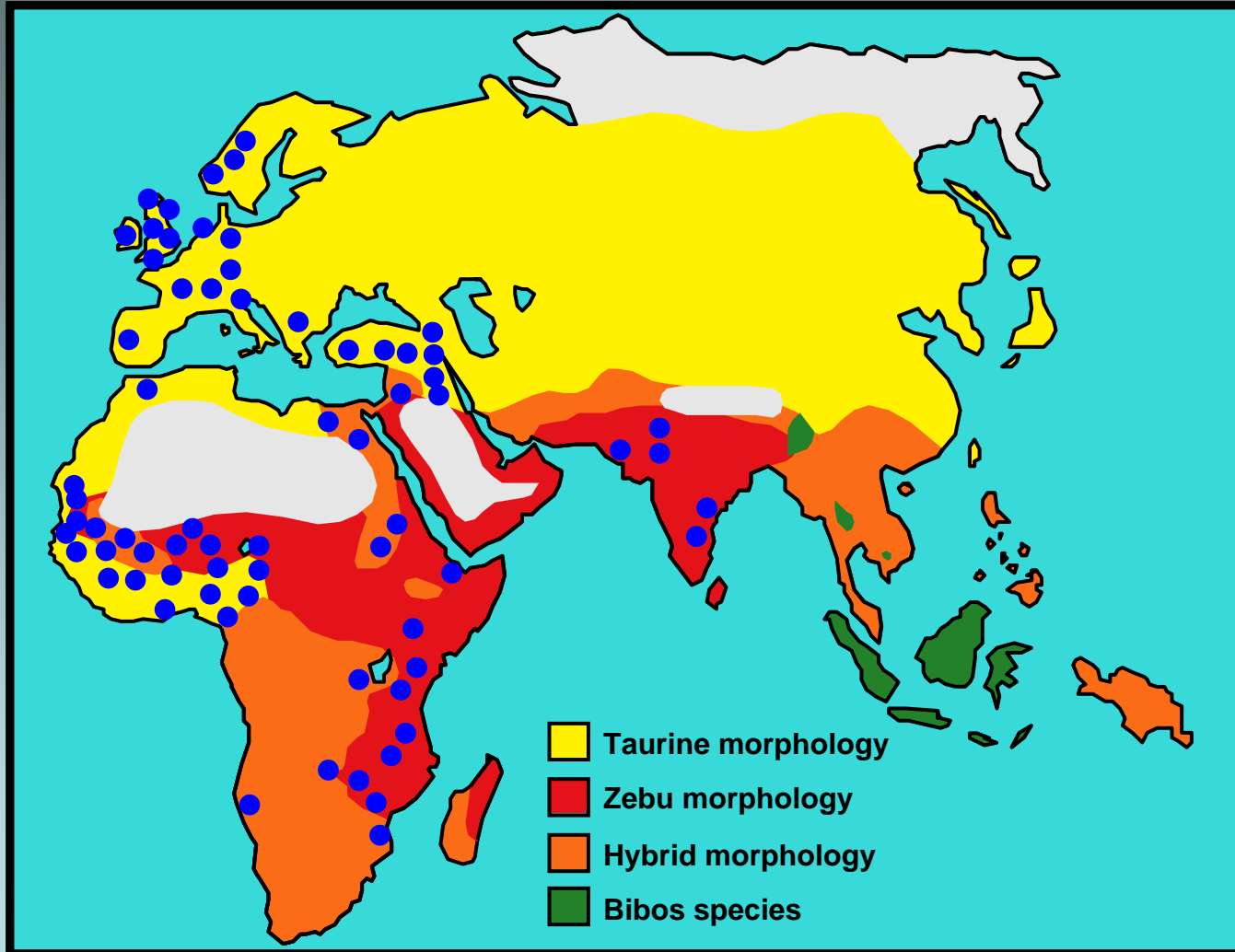


Kenana (Z)

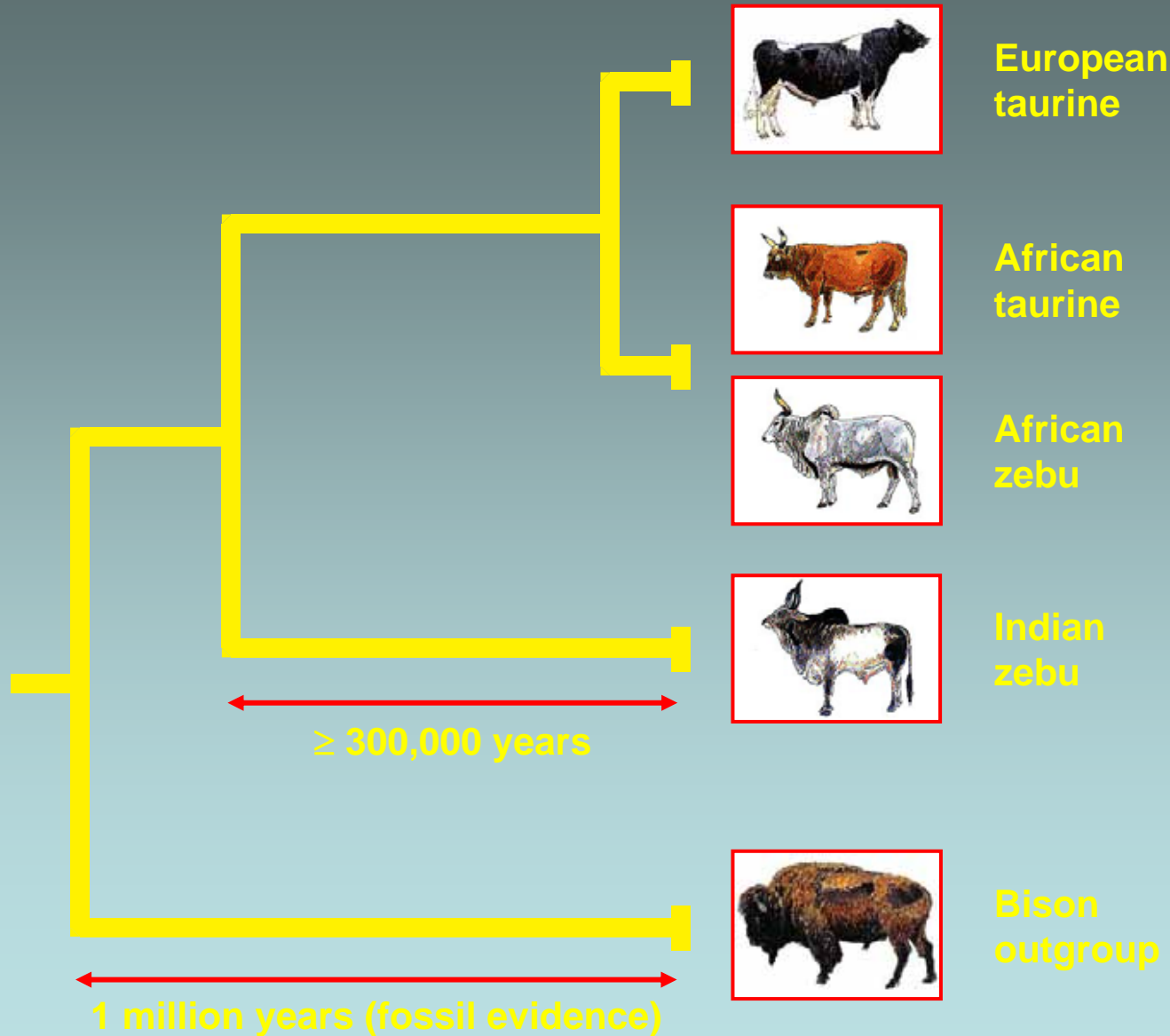


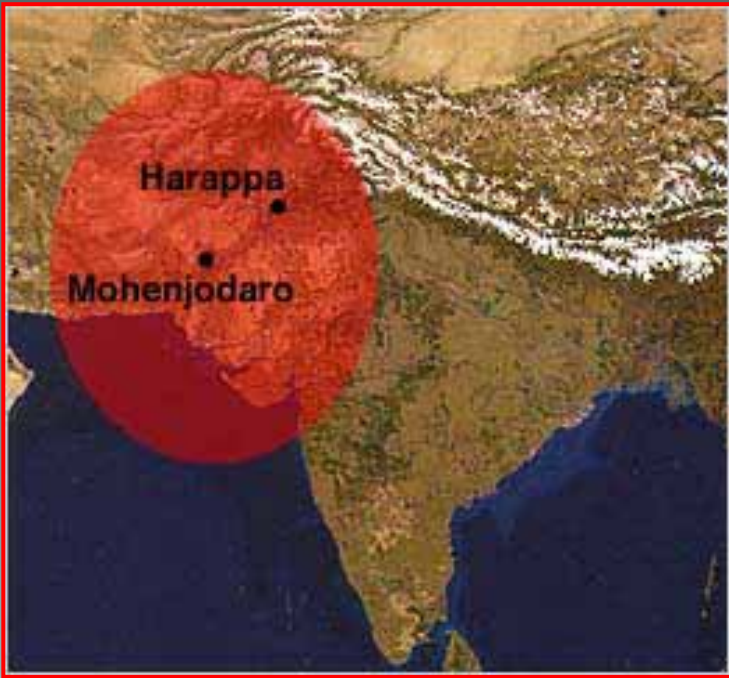
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- A map of Africa and Asia showing the distribution of different cow morphologies. The map is color-coded: yellow for Taurine morphology, red for Zebu morphology, orange for Hybrid morphology, and green for Bibos species. Arrows point from the various cow illustrations to their respective geographic regions on the map.
- Yellow: Taurine morphology
 - Red: Zebu morphology
 - Orange: Hybrid morphology
 - Green: Bibos species

Breeds sampled for DNA (20-50 animals per breed)



Simplified phylogeny from mtDNA control region sequences





Later
Harappan



